

**NEURAL MOBILIZATION FOR BRACHIAL NEURALGIA
AMONG CERVICAL SPONDYLOSIS PATIENTS**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF**

MASTER OF PHYSIOTHERAPY

ELECTIVE – SPORTS PHYSIOTHERAPY



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**NEURAL MOBILIZATION FOR BRACHIAL NEURALGIA
AMONG CERVICAL SPONDYLOSIS PATIENTS**

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**SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR
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DR. M.G.R. MEDICAL UNIVERSITY,
CHENNAI
(April-2011)**

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1. INTERNAL EXAMINER

2. EXTERNAL EXAMINER

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DECLARATION

I hereby declare and present my project work entitled “**NEURAL MOBILIZATION FOR BRACHIAL NEURALGIA AMONG CERVICAL SPONDYLOSIS PATIENTS**” The outcome of the original research work undertaken and carried out by me, under the guidance of Professor **Mr.B.KANNABIRAN,M.P.T.,(Ph.D.),RVS COLLEGE OF PHYSIOTHERAPY, Sulur, Coimbatore.**

I also declare that the material of this project work has not formed in any way the basis for the award of any other degree previously from the Tamil Nadu Dr. M.G.R Medical University.

SIGNATURE

ACKNOWLEDGEMENT

I express my sincere thanks to God, The almighty for providing me the strength and knowledge to complete my study successfully.

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I offer my thanks and gratitude to our librarians for their supports in providing books to complete my study.

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1. INTRODUCTION

Cervical spondylosis refers to common age related changes in the area of the spine at the back of the neck. With age the vertebrae gradually form bone spur, and their shock- absorbing disks slowly shrink. These changes can alter the alignment and stability of the spine. They may produce problems related to pressure on the spine and associated nerves and blood vessels.

Cervical spondylosis affects both sexes. But men usually develop it at an earlier age than women do.

Cervical spondylosis can also, lead to squashing of nearby nerves or the spinal cord leading to symptoms such as,

- Pain radiating from arms pins and needles
- Loss of feeling in hands

A syndrome associated with inflammation of the brachial plexus. The term brachial neuralgia generally refers to pain associated with brachial plexus injury.

Brachial neuralgia is a painful nerve disorder which radiates pain to the arm in the particular pathway of the affected nerve.

The pain of brachial neuralgia may be constant, sharp, stabbing, burning, shooting, radiating, annoying, debilitating and sometimes it comes and goes just like flashes one afraid of it.

Among all cervical vertebrae C5, C6, C7 are the more vulnerable vertebrae to degeneration or friction loss with movements. So brachial plexus of these roots often get inflamed.

Neural mobilization is an innovative management tool which involves conservative decompression of nerves, various neural mobilizing techniques and patient education techniques. Neural mobilization offers a fresh understanding and management strategies for common syndromes such as nerve root disorders, carpal tunnel syndromes, spinal pain, tennis elbow and plantar fasciitis.

Neural mobilization is a method of conservative treatment of disorders of neural tissue. The rationale for using neural mobilization in the treatment of musculoskeletal conditions is based on in vivo and in vitro studies which point to a high efficacy of neural mobilization procedures.

Essentially the entire nervous system is a continuous structure and it moves and slides in the body as we move and the movement is related to critical physiological processes such as blood flow to neurons. This movement is quite dramatic and it is not hard to imagine that fluid such as blood in the nerve bed, a constricting scar, inflammation around the nerve or a nerve having to contend with arthritic changes.

1.1 AIM AND NEED OF THE STUDY:

Brachial neuralgia is a common problem seen now a days. It is commonly treated by interferential therapy, TENS. They relieved symptoms symptomatically but are not useful in restoring function.

Neural mobilization and interferential therapy are practiced and found to be effective in treating brachial neuralgia among cervical spondylosis.

Hence there is a need for a study to know the effectiveness of nerve mobilization technique.

1.2 STATEMENT OF THE STUDY:

This is a study on the effect of neural mobilization technique for brachial neuralgia among cervical spondylosis patient.

1.3 HYPOTHESIS:

Null hypothesis

The null hypothesis is stated as there is no significant difference in reduction of pain and cervical rotation range of motion among cervical spondylosis patients with brachial neuralgia between group- I (ICT & IFT) and group- II (ICT & NEURAL MOBILIZATION).

Alternative hypothesis

The alternative hypothesis is stated as there is a significant difference in reduction of pain and cervical rotation range of motion among cervical spondylosis patients with brachial neuralgia between group- I (ICT & IFT) and group- II (ICT & NEURAL MOBILIZATION).

1.4 OPERATIONAL DEFINITIONS:

Nerve mobilization

This is a technique by which the nerves are stretched gently to relieve the tension that may have accumulated in them which causes symptoms like radiating pain, tingling sensations, weakness or numbness.

Restoring movement in a nerve technique by which neural tissues are moved, either by movement relative to their surrounding or by tension development.

Intermittent cervical traction

A sustained pull applied mechanically, especially to the arm, leg, or neck so as to correct fractured or dislocated bones, overcome muscle spasms or relieve pressure.

Traction is a mechanical force applied to the body in a way that separates the joint surfaces and elongates the surrounding soft tissues. Traction can be applied manually by the clinician or mechanically by a machine.

Interferential therapy

Interferential Therapy (IFT) is one of the various types of Physical Therapy. It uses a mid-frequency current for treating muscular spasms and strains. The current produces massaging effect over the affected area at periodic intervals, and this stimulates the secretion of endorphins, the body's natural pain relievers, thus relaxing the strained muscles and promoting soft-tissue healing. Use is contraindicated if the affected area has wounds, cuts or infections.

2. REVIEW OF LITERATURE

1. “Peripheral nerve under tension undergoes strains glides within its interfacing tissues. ULNTT causes strain within the peripheral nervous system and also places strain on multisegmental tissues.”

- **Mark T.Walsh PT, MS, CHT, ATC, hand and Orthopedic physical therapy associates, Levittown, Pennsylvania, 20 Apr 2005.**

2.“A course of upper limb stretching at least 3 times during work days in a six month period can prevent upper limb symptoms and signs of nerve afflictions in computer operators by improving the available space mobility of the nerves at the infraclavicular brachial plexus and posterior interosseous and median nerves at elbow level”

- **Jorgen R Jepson o Gert Thomsen, 2004**

3. “Intermittent mechanical cervical traction is rapidly improving muscle performance (grip strength) in patients having cervical radiculopathy (c7 related myotomal weakness)”.

- **Joghatei et al. RCT, 2004**

4. “Traction is shown to help restore sensation in 4 cervical radiculopathy patients having sensory deficits”.

- **Constantoyannis et al’s case series 2002.**

5. “Physical examination in brachial neuropathy combined with posterior interosseous and median nerve pathy patients showed reduction in isometric strength in ten upperlimb muscles, sensibility in five homonymous innervated territories and tenderness along nerve trunks at 14 locations”

- **Jespen JR, Deptt. Of occupational medicine, Syndyestiysk Sygchns, Ostergrade, Denmark, 2001**

6. “Traction is commonly employed in physical therapy to treat cervical radiculopathy. It is believed that it can reduce disk herniations, decompress the nerve root, or stretch ligaments and dural sheaths, thus reducing symptomatology”.

- **Moeti and Marchetti, 2001**

7. “Cervical radiculopathy most frequently afflicts adults in their fourth and fifth decades of life”.

- **Wainner & gill 2000.**

8. “Interferential current stimulation is its presumed capacity of inducing a powerful analgesic effects, similar if not superior to that attributed to TENS therapy”.

- **Cramp et al., 2000**

9. “Traction is effective in improving cervical radiculopathy related pain, sensory and myotomal deficits and function, but not reflex status, complemented with other physiotherapeutic treatments”

- **Corso & Brosky 1999.**

10. “Cervical traction has short term effectiveness on motor function & immediate improvement in pain patients with cervical radiculopathy”.

- **Abdulwahab 1999**

11. “There is evidence of traction induced electromyographic changes indicative of improved motor performance in the affected muscles”.

- **Abdulwahab’s experimental controlled study 1999.**

12. “The upper limb neurological examination which included mechanosensibility of nerve trunks isometric strength test, sensibility to touch, pain and vibration which might preferentially reflect peripheral neuropathy had demonstrated a promising interrater reproducibility”

- **Jespen JR, lansen LH, Hagert CG, kreiners, Larsen A, 1999**

13. “Interferential current therapy led him to question several beliefs associated with the effectiveness of such therapy, which are largely based on anecdotal evidence”.

- **Johnson 1999**

14.“patients presenting cervicobrachial symptoms may have elevated first rib, double-crush phenomenon, uncovertebral joint dysfunction and poor ergonomics careful management of all these will subside neck pain, upper trapezius pain and upper extremity paraesthesia”

- **Bismee, jean michel, Phelps, Valerisizer, Phillip, 1999.**

15. “There is no difference in the long term between surgical and conservative outcomes of cervical radiculopathy management”.

- **Persson & Mortiz 1998**
- **Person, Clarsson & Clarsson 1997.**

16. “Traction is effective in cervical muscle relaxation”.

- **Wong lee, Chang & tang 1997**

17. “43 to 60% of cervical radiculopathy patients will improve or restore spontaneously”.

- **Saal et al.1996.**

18. “Interferential current stimulation significantly increased the ice-pain threshold in healthy subjects compared to a control group that received no electrical stimulation”.

- **Stepheson et al., 1995**

19. “Interferential current therapy, indications reach well outside the field of pain, urinary incontinence, and blood flow/ edema management to include the management of a wide variety of systemic and local disorders”.

- **De domenico, savage, Nikolova 1987.**

20. “That the therapeutic effects associated with interferential current therapy may be attributed to among other factors, increasing blood circulation in the affected area”.

- **De domenico & Nikolova 1982.**

21. “ULNTT-II has a construct validity of accuracy”

- **Jospen JR, lansen LH, Hagert CG, kreiners, Larsen A.**

22. “Mechanical neck pain can effectively be managed through conservative treatment”

- **Peter daker, Auita R gross, Charles H goldsmith, Paul poloro.**

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Study design:

- The research design of this study is experimental, comparative in nature.

3.2 Settings:

- The study was conducted in RVS hospital
- Yasodha physiotherapy centre, H.S hospital
- Vinayaga physiotherapy centre, V.G medical centre

3.3 Inclusion criteria:

- Brachial neuralgia with cervical spondylosis
- Decreased cervical rotation ROM
- Age group 25-40
- Both sexes(male and female)
- White collar occupation

3.4 Exclusion criteria:

- Neurological fatigue- myopathies
- Hypersensitive
- Inter vertebral disc prolapsed
- Headache with autonomic Involvement, dizziness
- congenital condition of cervical spine

3.5 Sample population:

- 20 subjects and 10 in each group.

3.6 Sample selection:

- Random sampling technique.

3.7 VARIABLES USED IN THE STUDY

Independent variable

- Nerve mobilization technique
- Intermittent cervical traction
- Interferential therapy

Dependent variable

- Pain
- Cervical rotation Range of motion

3.8 METHODOLOGY

Twenty samples selected from the population divided into two equal groups

The procedure was explained to subject

Both the group under went a pre test measurement of pain intensity and cervical rotation range of motion

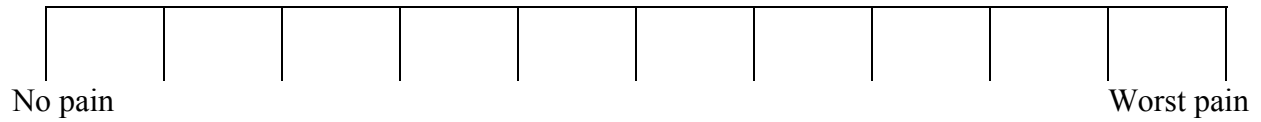
Group I treated with intermittent cervical traction and interferential therapy

Group II treated with intermittent cervical traction and neural mobilization for 2weeks and they followed for 3 months

Hence both groups are treated and after 2 weeks measured pain by visual analogue scale and cervical rotation range of motion measured by measuring tape.

3.9 MEASURING TOOL:

- **Pain scale (Visual VAS analogue scale)**



Visual analogue scale consists of 10 cm horizontal line with 2 end points, labeled no pain and worst pain respectively. The patient is requested to place a mark on the 10Cm line to know his pain intensity at that particular time (presently feeling).

The distance in cm from the lower end of VAS to the patients mark is used as a numerical index of the severity of pain

- **measuring tape**



Cervical rotation range of motion:

Position of patient:

High sitting

Position of therapist:

In front of the patient

Measurement :(tape measure)

A linear measure is obtained through the use of a tape measure for cervical spine movement.

Start position:

The patient is sitting on a chair with a back support. The head and neck are in the anatomical position.

End position:

The patient rotates the head (without flexing or extending) to the limit of rotation.

Measurement:

A tape measure is used to measure the distance between the tip of the chin and the acromion process.

A measure is taken in the anatomical position and at the limit of motion of rotation.

4. DATA ANALYSIS AND INTERPREATION

The data were collected from 20 cervical spondylosis patients having the manifestation of brachial neuralgia who were referred to the physiotherapy department of RVS hospital, Yashoda physiotherapy centre, H.S hospital, and Vinayaga physiotherapy centre, pre test and post test values were taken and the outcome (by means of reduction of pain and improving cervical range of motion) was evaluated for both the groups.

Descriptive statistical analysis was done by using paired 't' test and unpaired 't' test.

Paired (dependent) 't' test was used to find improvement in the groups.

Unpaired (independent) 't' test was used to find out effectiveness of the treatment when it was compared with the other.

The following formulas were used:-

1. Dependent (paired) 't' = \bar{d} / SE

Where 'd' = difference between pre test and post test values

'n' = number of subjects

\bar{d} = Average of the distance between pre test and post test

$$\begin{aligned} Sd \text{ (Standard deviation)} &= \sqrt{\sum (d - \bar{d})^2 / n - 1} \\ (SE) \text{ Standard error} &= Sd / \sqrt{n} \end{aligned}$$

$$2. \text{ Independent (unpaired) 't' } = \frac{|\bar{x}_2 - \bar{x}'_2|}{\sqrt{[\{(n-1)s_1^2 + (n'-1)s_2^2 / (n+n')-2\} \times (1/n + 1/n')]}}$$

$$S_1(\text{standard deviation for group I}) = \sqrt{[\sum (x_2 - \bar{x}_2)^2 / n - 1]}$$

$$S_2(\text{standard deviation for group II}) = \sqrt{[\sum (x'_2 - \bar{x}'_2)^2 / n' - 1]}$$

x_2 = individual data (post test) for group- I

$$\bar{x}_2 (\text{mean of } x_2) = \sum x_2 / n$$

x'_2 = individual data (post test) for group II

$$\bar{x}'_2 (\text{mean of } x'_2) = \sum x'_2 / n'$$

n (number of patients in group-I) = 10

n' (number of patients in group-II) = 10

Table-1a

Mean pain score for group-I before and after treatment (ICT&IFT) and its statistical significance (paired 't' test)

INTERVENTION	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
BEFORE	6.1	2.5	0.53	14.97*
AFTER	3.6			

*Significant

The calculated 't' value (14.97) is greater than the 't' table value (1.883) hence there is statistically significant improvement in group-I following intervention.

df= degree of freedom=9

$P \leq 0.05$ (the probability of observing value of 't' greater than 1.883 at 9 degree of freedom is 0.05 or 5%)

Table-2a

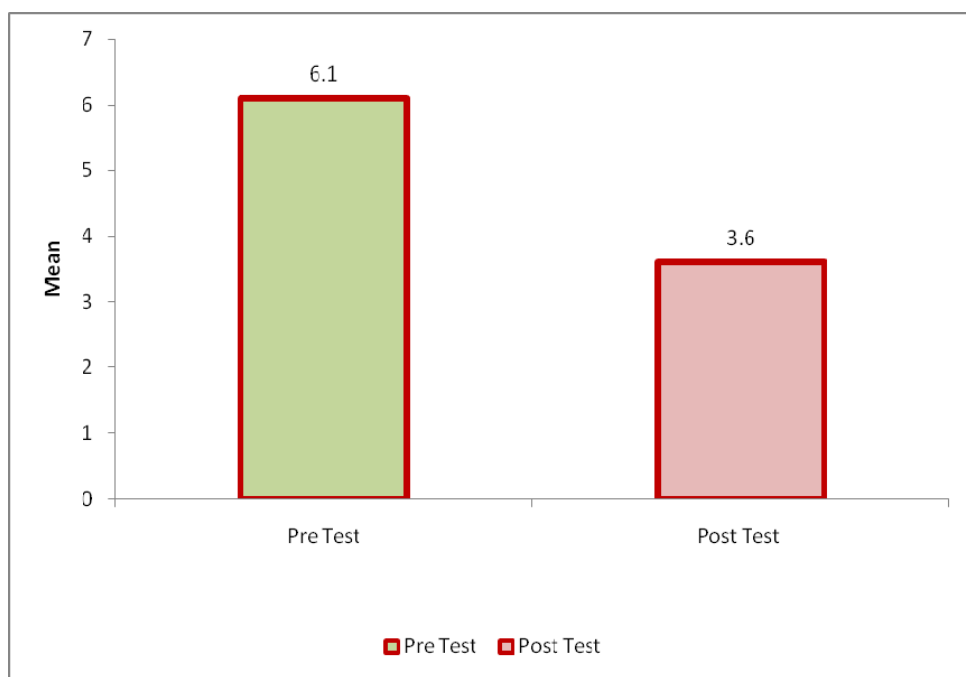
Mean pain score for group-II before and after intervention (ICT& NEURAL MOBILIZATION) and its statistical significance (paired 't' test).

INTERVENTION	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
BEFORE	6.1	2.9	0.316	29*
AFTER	3.2			

*Significant

The calculated 't' value (29) is greater than the 't' table value (1.833) which shows statistically significance of improvement in group-II after intervention.

GRAPH - I
Mean pain score for group-I



GRAPH - II
Mean pain score for group-II

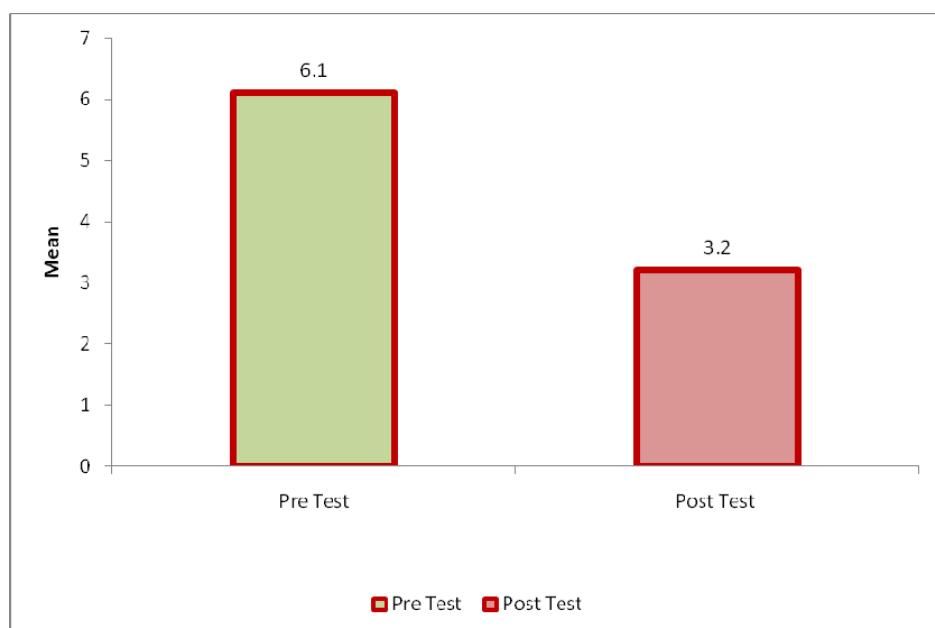


Table-3a

Mean pain score for group-I (ICT&IFT) and group-II (ICT& NEURAL MOBILIZATION) after intervention and their statistical significance (unpaired‘t’ test)

GROUP-I		GROUP-II		MEAN DIFFERENCE	UNPAIRED ‘t’ TEST
MEAN	SD	MEAN	SD		
3.6	0.699	3.2	0.789	0.4	3.603*

*Significant

The calculated’ value (3.603) is greater than the‘t’ table value (1.734) which indicates statistical significance between group-I and group-II (after intervention).

df= degree of freedom=18

$P \leq 0.05$ (the probability of observing value of ‘t’ greater than 1.734 at18 degree of freedom is 0.05 or 5%).

GRAPH- III
Mean pain score between group-I and group-II

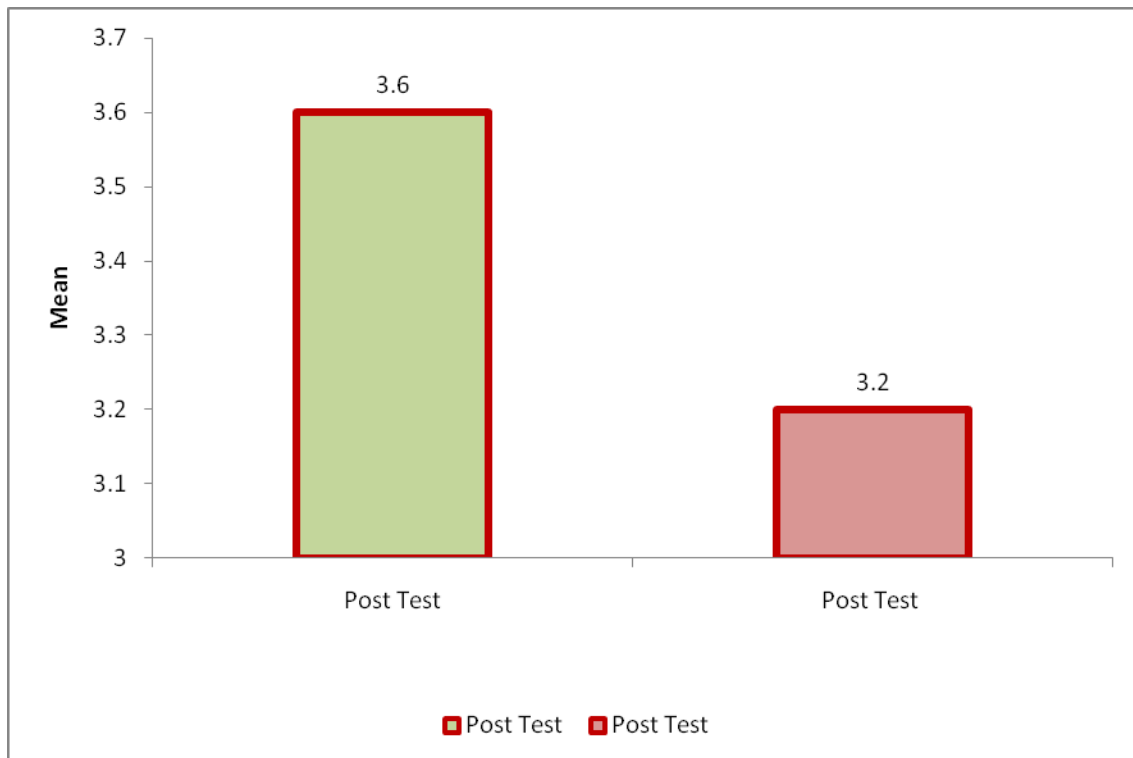


Table-1b

Mean cervical rotation ROM score for group-I (ICT&IFT) and its statistical significance

INTERVENTION	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
BEFORE	4.2	2.4	0.516	14.72*
AFTER	6.6			

*Significant

The calculated 't' value for group-I (14.72) is greater than the 't' table value 1.833 at 9 degrees of freedom which indicates statistically significant improvement in group-I after treatment.

Table-2b

Mean cervical rotation range of motion score for group-II before and after intervention
(ICT& NEURAL MOBILIZATION)

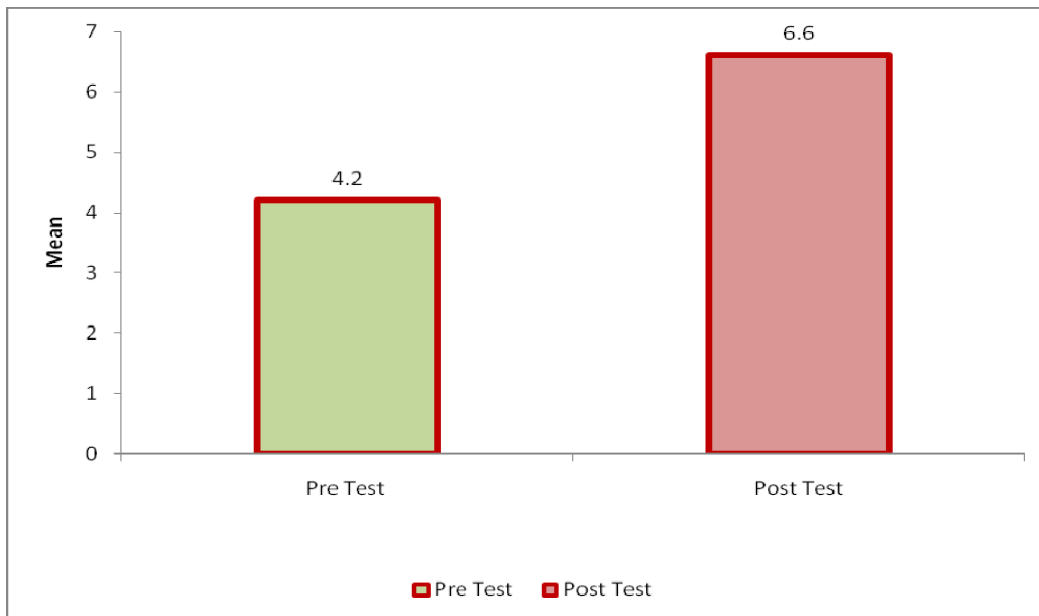
INTERVENTION	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED 't' VALUE
BEFORE	4.4	3.2	0.422	23.988*
AFTER	7.6			

*Significant

The calculated 't' value (23.988) is greater than the 't' table value (1.833) showing high significance of improvement statistically for group-II after intervention.

GRAPH – IV

Mean cervical rotation range of motion for group-I



GRAPH - V

Mean cervical rotation range of motion for group-II

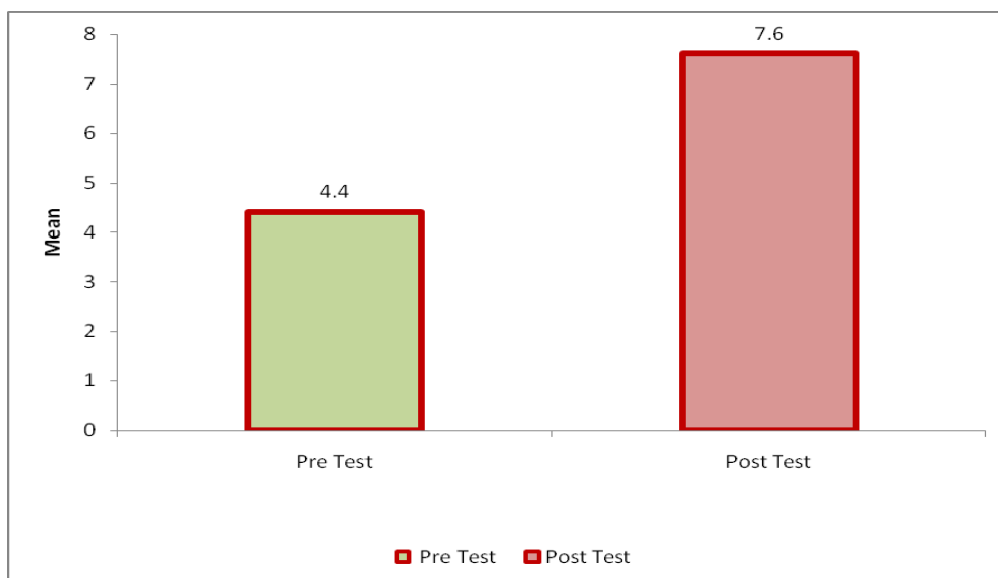


Table-3b

Mean cervical rotation range of motion score for both group-I (ICT&IFT) and group-II (ICT&NEURAL MOBILIZATION) after treatment

GROUP-1		GROUP-II		MEAN DIFFERENCE	UNPAIRED 't' TEST
MEAN	SD	MEAN	SD		
6.6	1.476	7.6	1.229	1.0	1.647*

*Significant

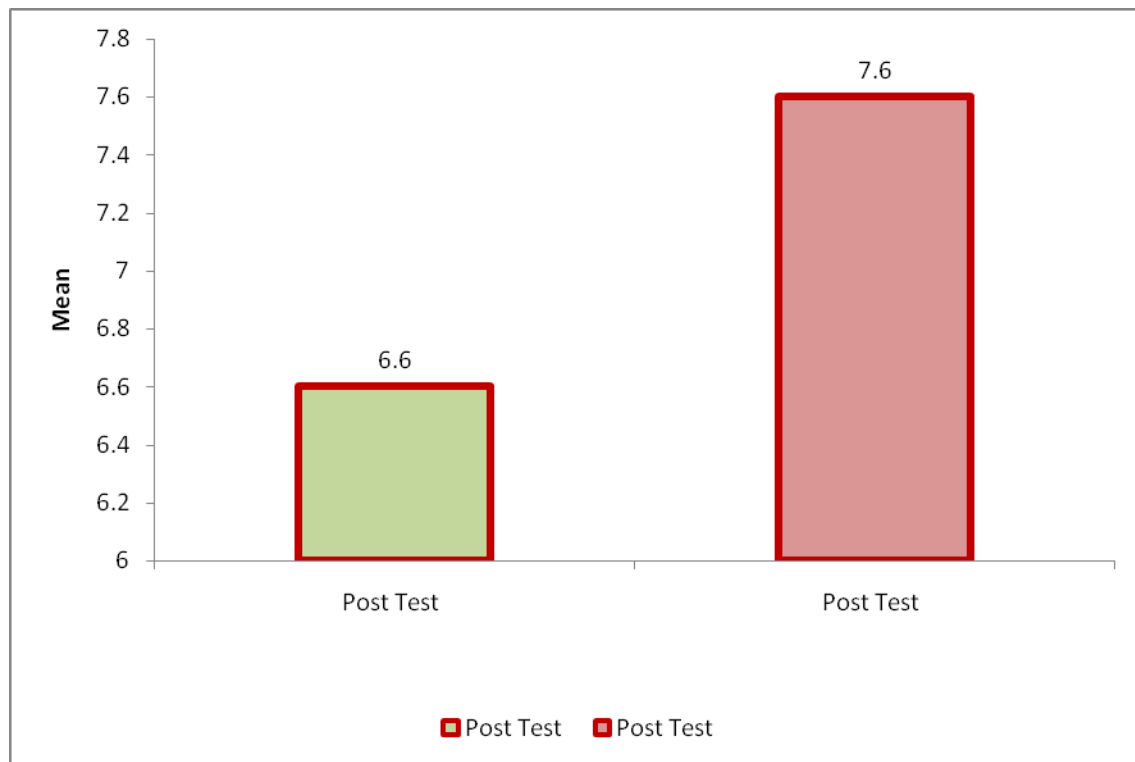
The calculated 't' value (1.647) is greater than the 't' table value (1.734) which indicates statistical significance between group-I and group-II (after intervention).

df= degree of freedom=18

$P \leq 0.05$ (the probability of observing value of 't' greater than 1.734 at 18 degree of freedom is 0.05 or 5%).

GRAPH- VI

Mean cervical rotation range of motion between group-I and group-II



INTERPRETATION OF DATA

1. Calculated value of paired 't' test for group I (Pain) = 14.97
2. Calculated value of paired 't' test for group II (Pain) = 29
3. Calculated value of paired 't' test for group I (cervical rotation range of motion)
= 14.72
4. Calculated value of paired 't' test for group II (cervical rotation range of motion)
= 23.988
5. Calculated value of independent 't' test for pain = 3.603
6. Calculated value of independent 't' test for cervical rotation range of motion
= 1.647

5. RESULTS

A comparative study was conducted to find out the effectiveness of neural mobilization for brachial neuralgia among cervical spondylosis patients.

Twenty (20) cervical spondylosis patients with brachial neuralgia referred to the physical therapy department of RVS multispecialty hospital we agreed to participate in the study and were randomly divided into 2 groups, group-I and group-II, each having 10 subjects. Group-I subjects were treated with intermittent cervical traction and interferential therapy for a period of two weeks. Group-II subjects were treated with intermittent cervical traction and neural mobilization for 2 weeks.

The mean difference of reduction of pain is 2.5 for group-I and that of group-II is 3.2. The calculated 't' value for group-I is 14.97 and that of group-II is 29 were as the 't' table value is 1.883 at 0.05 level. This result shows statistical significance of reduction of pain in both groups. But group-II shows high significance.

The calculated unpaired 't' test for both the groups are 3.603 which is greater than the table 't' value (1.734) which is significant. Hence neural mobilization is effective in reducing pain.

The mean difference of improvement in range of motion for group-I is 2.4 and that is for group-II is 3.2. The paired 't' test for group-I is 14.72 and that of group-II is 23.988. The table 't' value is 1.833 at 0.05 levels which is less than the calculated 't' values. This indicates that both the groups have improvement after intervention but the group-II is statistically more significant than the group-I.

When the groups were compared with unpaired 't' test the calculated value (1.647) is less than the 't' table value (1.734) at 0.05 level for range of motion. This indicates that they are statistically more significant for cervical rotation ROM.

The highly significant calculated paired 't' value for group-II shows remarkable improvement in range of motion after neural mobilization. Above mentioned 't' test values show significant improvement when compare to the table value. Hence the null hypothesis is rejected and the alternate hypothesis is accepted.

The alternate hypothesis stated as, there is a significant difference in the rehabilitation of brachial neuralgia in between group-1(ICT&IFT) and group-II (ICT&NERVE MOBILIZATION) among cervical spondylosis patients.

6. DISCUSSION

Reduction in pain intensity was significant in both the groups (intermittent cervical traction with interferential therapy and intermittent cervical traction with neural mobilization). Pain relief in both the group occurred due to correction of positional fault and reduced stress in neck structures.

Restricted cervical rotation range of motion is one of the causes for brachial neuralgia among cervical spondylosis. The application of intermittent cervical traction with interferential therapy and intermittent cervical traction with neural mobilization facilitated the increase in cervical rotation range of motion and reduced pain.

There was statistically significant improvement in cervical rotation range of motion and decrease in pain on the last day of treatment in both the groups, but group II (ICT & NEURAL MOBILIZATION) showed more significance.

7. SUGGESTION

- The study can be done in large samples
- Study can be carried out for longer period of time
- Control group can be added
- Study can be done in other area of the body.

LIMITATION

- The study was done for a short span
- This study was applied for age group 25 -40 years
- This study was done only on patient with positive neural tension test
- This study was done only on subjects in white collar occupation.

8. CONCLUSION

There was no base line difference between group-I and group-II in the sample, but after intervention there is significant improvement in both the groups, but group-II showed more significant improvement than group-I. Hence the null hypothesis is rejected and the alternate hypothesis is accepted. The result concluded that neural mobilization is more effective than interferential therapy while combined with intermittent cervical traction in the rehabilitation of brachial neuralgia among cervical spondylosis patients and hence it can be combined with intermittent cervical traction to reduce pain and improve cervical rotation ROM for brachial neuralgia patients.

9. REFERENCE

- Mobilisation of the nervous system, David S. Butler B. Pty, Grad Dip [1991]
- Nerve mobilization of the upper extremity, Caroline Joy Co Pt [2010]
- Management of peripheral nerve problems, George E. Omer, Morton Spinner [1980]
- Clinical sports medicine, Brunker, Karim Khan, Peter Brunkner, page- 236
- Physical therapies in sport and exercise, Gregory S.Kolt, Lynn Snyder-Mackles[2007], page- 95
- Management of common musculoskeletal disorders: physical therapy, Darlene Hertling, Randolph M Kessler [2006], page- 319
- Chronic pain management for physical therapists, Harriet Wittink, Theresa Hoskins Michel [2002], page- 221
- Practical manual of physical medicine and rehabilitation, Jackson C. Tan [2006], page- 746
- Physical medicine and rehabilitation: principles and practice volume 1, Joel A Delisa, Burce M Gans, Nicholas E Walsh [2005], page- 302
- Text book of cervical apondylosis, Ramani[2004]
- Therapeutic modalities: the art and the science, Kenneth L. Knight, David O. Draper [2007], page- 333
- Therapeutic modalities in sports medicine, William E. Prentice [1999]

- Physical therapies in sports and exercise, Gregory S. Kolt, Lynn Synder- Mackler [2007], page- 275
- Physical modalities, Paul D.Hooper,DC
- Evidence- based guide to therapeutic physical agents, Alain- Yvan Belanger
- Electrotherapy: evidence- based practice volume 1, Sheila Kitchen, Sarach Bozin [2002], page- 299
- Neural mobilization: A systematic review of randomized controlled trails with an analysis of therapeutic efficacy, Michael Shacklock, MAppSc, Dip Physio, FACP, MAMP, MMPA, [2008]

10. APPENDIX

Appendix-I

Appendix-Ia

Procedures:

Neural mobilization:

ULTT1

The technique described is for a left ULTT1 in a non-irritable disorder where full ranges of finger, wrist, elbow, shoulder and neck movements are present.

The patient is positioned in neutral supine, towards the left hand side of the couch. A pillow is not normally required, however, if used; it should become a standard feature of later re-testing. The examiner faces the patient in stride standing, his right hand holding her left hand ensuring control right down to the thumb and finger tips. Her upper arm rest on the examiner's left thigh.

A constant depression force is placed on the shoulder girdle during the movement. This is best achieved by examiner's fist being pushed down vertically into the bed such that the neutral shoulder girdle position can be maintained. Consequently, elevation of the shoulder girdle is prevented during abduction.

With this position maintained, the forearm is supinated and the wrist and fingers extended.

The shoulder is laterally rotated

The elbow is extended. Earlier component positions must be strictly maintained.

With this position held cervical lateral flexion to the left and then to the right are added. If asked to turn her head to the side, the patient will inevitably rotate rather than laterally flex the neck. Before performing the test, it is best to explain to the patient what is expected.

ULTT2a

The patient lies slightly diagonally across the bed with her head towards the left hand side of the bed and her scapula free of the bed. The examiner's right thigh rests against the patient's left shoulder. His right hand holds the patient's elbow and his left hand holds her wrist. This crossed-arm starting position means that the position of the physiotherapist's hand will require minimal changes during the maneuvers, and the technique will be smoother and better controlled.

Using his thigh, the examiner carefully depresses the patient's shoulder girdle. In this position and indeed, throughout the test, it is possible to look at the patient's face from under the examiner arm to pick up any non-verbal information. Quite a sensitive feel can be developed with the thigh and obvious advantage is that the depression can be maintained, leaving two hands free for movement combinations of the rest of the arm. The test will have to be performed in approximately 10° of shoulder abduction so that the arm is clear and parallel to the side of the bed.

The shoulder depression is maintained and then the examiner subsequently extends the patient's elbow.

The shoulder girdle depression/elbow extension position is maintained and the examiner, using both arms, laterally rotates the patient's whole arm.

With this position maintained, the examiner's left forearm is pronated and slides down to the patient's hand. The examiner's thumb is slipped in the web space between the patient's thumb and index finger. The examiner then extends the patient's wrist, fingers and thumb. This position provides good control over the arm, including the tips of the fingers

The most common sensitizing addition is abduction of the shoulder.

ULTT2b

The starting position, shoulder girdle movements and the elbow extension are the same as for the test with median nerve bias.

With this position maintained, the shoulder is then medially rotated. This is the key factor to the test. The examiner must reach under the patient's arm as far as possible with his left arm grasp her wrist. The patient's whole arm is then guided into medial rotation at the shoulder, inevitably with pronation of the forearm. With the medial rotation taken up, it should be possible for the examiner's left elbow to 'lock' against the patient's left elbow, thus keeping it in extension and maintaining the medial rotation. The examiner will know if the position is held securely enough because his right arm will be relatively free to guide the patient's arm. This free arm will ultimately be invaluable for treatment techniques, for example, techniques such as mobilizing the radial head or deep frictioning at the elbow for the common involvement of the nervous system in tennis elbow.

The patient's wrist is then flexed; either actively or passively using the examiner's left hand. Flexion of the thumb joints and ulnar deviation of the wrist will

further sensitise the radial nerve via the superficial sensory branch. Alternatively, the examiner can slide his right hand down the patient's arm a little to control the wrist, thumb and finger flexion.

Appendix-Ib

Interferential therapy:

Interferential current consists of two AC current that are slightly out of phase with each other. To gain the interferential effect, the electrodes must be arranged so that the currents intersect. To accomplish this, the electrodes are arranged in a criss - cross manner.

Dynamic interferential current is accomplished by continually altering the intensity of two currents. After initially raising the intensity in both currents to the desired level, one current is reduced to 75% of the selected intensity. The intensity of second current continually wavers between 50% and 100% of its original value. The effect of this current modulation results from the patient's attention being drawn back and forth between the current that has the highest level of intensity. Because the intensity constantly changes throughout the treatment duration. The current appears to move around on the surface of the patient skin.

Treatment frequencies

While frequency ranges vary from manufacturer to manufacturer, basic therapy ranges are fairly consistent. Frequencies which vary from approximately 80Hz to 120Hz are considered most effective for acute pain while lower frequencies of perhaps 3Hz to 5Hz or 2Hz to 10Hz are preferred for the treatment of chronic pain. Some units feature a nerve block setting where both channels produce an output of 4000Hz to create an interferential nerve block to quickly block out acute pain.

Appendix-Ic

Intermittent cervical traction:

Traction forces that are alternately applied and released (hold and rest). In this form of traction a moderate force is applied for a period of time, usually from 30 to 60 seconds. This is referred to as the “hold time”. This moderate force is then reduced to a lesser traction force that is applied for a shorter period – from 10-20 seconds – the rest period.

The traction device alternates between the two different forces for the treatment duration, there by producing not only traction and separation, but some degree of movement

Intermittent cervical traction may be most effective for reducing pain and increasing cervical range of motion in a variety of cervical conditions and may be particularly helpful for reducing symptoms associated with mechanical neck disorders.

Appendix-II

Pain:

Test-1a

Pain score for group-I (ICT&IFT) before and after treatment

SL NO	PRE TEST x_1	POST TEST x_2	DIFFERENCE 'd'	$d - \bar{d}$	$(d - \bar{d})^2$
1	7	4	3	0.5	0.25
2	6	3	3	0.5	0.25
3	5	3	2	-0.5	0.25
4	7	5	2	-0.5	0.25
5	6	4	2	-0.5	0.25
6	5	3	2	-0.5	0.25
7	7	4	3	0.5	0.25
8	7	4	3	0.5	0.25
9	6	3	3	0.5	0.25
10	5	3	2	-0.5	0.25
n=10	$\Sigma x_1=61$	$\Sigma x_2=36$	$\Sigma d=25$		$\Sigma (d - \bar{d})^2=2.5$

TEST- 2a

Pain score for group-II before and after intervention (ICT& NEURAL MOBILIZATION)

SL NO	PRE TEST x'_1	POST TEST x'_2	DIFFERENCE 'd'	$d - \bar{d}$	$(d - \bar{d})^2$
1	5	2	3	0.1	0.01
2	7	4	3	0.1	0.01
3	5	3	2	-0.9	0.81
4	6	3	3	0.1	0.01
5	7	4	3	0.1	0.01
6	6	2	3	0.1	0.01
7	7	4	3	0.1	0.01
8	6	3	3	0.1	0.01
9	5	2	3	0.1	0.01
10	7	4	3	0.1	0.01
n=10	$\Sigma x'_1=61$	$\Sigma x'_2=32$	$\Sigma d=29$		$\Sigma (d - \bar{d})^2=0.90$

Test-3a

Pain score of both group-I (ICT&IFT) and group-II (ICT&NEURAL MOBILIZATION)
after intervention

SL. NO	GROUP-I x_2	GROUP-II x'_2	$\bar{x}_2 - \bar{x}_2$	$(\bar{x}_2 - \bar{x}_2)^2$	$x'_2 - \bar{x}_2$	$(x'_2 - \bar{x}_2)^2$
1	4	2	0.4	0.16	-1.2	1.44
2	3	4	-0.6	0.36	0.8	0.64
3	3	3	-0.6	0.36	-0.2	0.04
4	5	3	1.4	1.96	-0.2	0.04
5	4	4	0.4	0.16	0.8	0.64
6	3	3	-0.6	0.36	-0.2	0.04
7	4	4	0.4	0.16	0.8	0.64
8	4	3	0.4	0.16	-0.2	0.04
9	3	2	-0.6	0.36		1.44
10	3	4	-0.6	0.36	0.8	0.64
n=10	$\Sigma x_2=36$	$\Sigma x'_2=32$		$\Sigma (\bar{x}_2 - \bar{x}_2)^2=4.4$		$\Sigma (x'_2 - \bar{x}_2)^2=5.6$

Appendix-III

Cervical rotation range of motion:

Test-1b

Mean range of motion score for group-I before and after intervention (ICT&IFT)

SL. NO	PRE TEST x_1	POST TEST x_2	DIFFERENCE 'd'	$d - \bar{d}$	$(d - \bar{d})^2$
1	3	5	-2	0.4	0.16
2	4	6	-2	0.4	0.16
3	5	8	-3	-0.6	0.36
4	5	8	-3	0.6	0.36
5	6	9	-3	0.6	0.36
6	4	7	-3	0.6	0.36
7	3	5	-2	0.4	0.16
8	5	7	-2	0.4	0.16
9	4	6	-2	0.4	0.16
10	3	5	-2	0.4	0.16
n=10	$\Sigma x_1=42$	$\Sigma x_2=66$	$\Sigma d=24$		$\Sigma (d - \bar{d})^2=2.4$

Test-2b

Mean ROM score for group-II before and after treatment (ICT&NEURAL MOBILIZATION)

SL. NO	PRE TEST x^1_1	POST TEST x^1_2	DIFFERENCE 'd'	$d - \bar{d}$	$(d - \bar{d})^2$
1	5	8	-3	0.2	0.04
2	4	7	-3	0.2	0.04
3	4	7	-3	0.2	0.04
4	6	9	-3	0.2	0.04
5	3	6	-3	0.2	0.04
6	3	6	-3	0.2	0.04
7	5	8	-3	0.2	0.04
8	4	7	-3	0.2	0.04
9	5	9	-4	-0.8	0.64
10	5	9	-4	-0.8	0.64
n=10	$\Sigma x^1_1=44$	$\Sigma x^1_2 = 76$	$\Sigma d=24$		$\Sigma(d - \bar{d})^2=1.6$

Test -3b

ROM score for both group-I (ICT&IFT) and group-II (ICT&NEURAL

MOBILIZATION) after intervention and their unpaired 't' test

SL. NO	GROUP-I x_2	GROUP-II x'_2	$\bar{x}_2 - \bar{x}_2$	$(\bar{x}_2 - \bar{x}_2)^2$	$x'_2 - \bar{x}_2$	$(x'_2 - \bar{x}_2)^2$
1	5	8	-1.6	2.56	0.4	0.16
2	6	7	-0.6	0.36	-0.6	0.36
3	8	7	1.4	1.96	-0.6	0.36
4	8	9	1.4	1.96	1.4	1.96
5	9	6	2.4	5.76	-1.6	2.56
6	7	6	0.4	0.16	-1.6	2.56
7	5	8	-1.6	2.56	0.4	0.16
8	7	7	0.4	0.16	-0.6	0.36
9	6	9	-0.6	0.36	1.6	2.56
10	5	9	-1.6	2.56	1.6	2.56
n=10	$\Sigma x_2 = 66$	$\Sigma x'_2 = 76$		$\Sigma (\bar{x}_2 - \bar{x}_2)^2 = 19.6$		$\Sigma (x'_2 - \bar{x}_2)^2 = 13.6$

APPENDIX IV

ASSESSMENT FORMAT

Subjective assessment

- Name
- Age
- Sex
- Occupation
- Chief complaints
- History of illness
 - a) Present history
 - b) Past medical history
 - c) Personal history
- Associated medical problems
- Pain assessment
 - Duration
 - Onset
 - Frequency
 - Nature of pain
 - Aggravating factors
 - Relieving factors
 - Intensity
- Vital signs
- Temperature

- Blood pressure
- Pulse rate
- Respiratory rate

Objective assessment

On observation

- Built of patient
- Posture
- Structural abnormality

On palpation

- Tenderness around neck region
- Spasm

On examination

- Cervical range of motion using measuring tape

Differential diagnosis

Management

- Aims
- Means
- Follow up

PATIENT CONSENT FORM

I _____ voluntarily consent to participate in the research named

“NEURAL MOBILIZATION FOR BRACHIAL NEURALGIA AMONG CERVICAL SPONDYLOSIS PATIENTS”

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of Participant :

Signature of the Witness :

Signature of Researcher :

Date :

Place :